

Appl No. 10/804/709  
Amdt. dated October 28, 2005  
Reply to Office action of March 06, 2006

**Amendments to the Drawings:**

There are no amendments to the drawings, but please amend the drawing description as

follows:

Drawings are objected to under 37CFR1.8(a), fluid passages between the vanes being

near to tangential at intake plenum but curving toward radial, and being radial near the

periphery of the cylinder of rotation, and then turning away from the direction of rotation,

and continuing in a peripheral direction around a cylindrical path to end by the vane

extending [[axially]] radially outward to a close tolerance with the inner cylindrical wall

of the housing chamber – this is shown in Fig 3A. The Claim for this is now Claim 28.

### **REMARKS/ARGUMENTS**

The specification has been amended to correct minor editorial problems, primarily

the use of axial and radial. So as to conform to standard practice.

The Claims 1-14 are cancelled and new Claims 15-27 are added which contain

more information as to what the invention is.

### **Claim Rejection 35 USC 112**

The invention embodiments in this application involve new and novel steps to obtain pumps with better performance and operating on different principles than centrifugal pumps. This pump uses inertia rather than direct force applied on the fluid from impeller vanes like is done with centrifugal pumps. It is a simpler and more straightforward theory than centrifugal pump theory.

In these embodiments, the fluid enters passages between vanes blades in a rotor-impeller driven by atmospheric or other intake pressure. The passages are only open during discharge, and as one volume is discharged, another volume enters the passage. The passage becomes a closed chamber during rotation and the fluid acquires rotational energy and a pressure gradient within the chamber due to centrifugal force in a rotating contained fluid. The closed chamber has boundaries of the rotor and vanes, and the housing walls, but on the radially inner surface, is contained by a divergent force field, centrifugal force, such that the inner boundary of containment consists of an isobar, a fluid surface of equal pressure. In centrifugal pumps, propellers, or axial turbines, it is essential that the blades or vanes strike the fluid, moving it. With this invention, it is essential that the blades don't strike the fluid. In order to accomplish this there are three alternatives shown.

1. That the intake enters the rotor or turbine passages tangentially, rather than axial bending to radial as in a centrifugal pump. Thus the intake is not on the axis of revolution in this part of the invention. This requires the rotor be conical, with a matching conical housing. This also allows the shaft to be

supported on both sides of the rotor. This allows the intake fluid stream to enter the fluid passages in the rotor in a straight line. This allows more than one tangential intake. This allows the rotor to be supported on both sides rather than being cantilevered.

The tangential intake feature 1 is shown in Fig 5A, Fig 5B, Fig 6A, Fig 6B. This feature is not shown in any of the cited art of Price, Ask, or Chow.

2. If we desire to introduce the intake fluid axially as done by a centrifugal pump, in order to stop the vanes from striking the fluid, we can take additional steps to avoid this. A. We can put fixed spiral vanes in the intake housing to change the direction of the fluid to be tangential. B. We can put a conical protrusion on the rotor at the axis of rotation, which changes the flow from axial to radial, but in this case, requires tangential orientation of the radially inner vane tips.

The features 2 to use an axial intake are shown in Fig 1A, Fig 1B, Fig 1C, Fig 1D, Fig 2A, Fig 2B, Fig 2C, Fig 3A, Fig 4A, Fig 8A, Fig 8B, Fig 9A, Fig 9B.

These features are not shown in the cited art, except for a small axial protrusion in the pump of Ask, which would not accomplish this.

3. Or we can design the vane radial inner edge to intersect the intake fluid having radial direction tangentially, which allows the fluid to enter the rotor fluid passage without being struck by the vane, due to the angle of incidence. Then the vane profile can be angled away from the direction of motion to avoid having the vane striking the fluid during the filling of the rotor passage chambers, or use a combination of these solutions.

This feature is illustrated in Fig 1A, Fig 2A, Fig 2B, Fig 3A, Fig 4A, Fig 6A, Fig 8A and Fig 9A.

This feature is not shown in any other cited art except that it is shown in a backward direction in Price, which is opposite and cannot serve this function.

4. The angle of the leading edge of the rotor vane or blade at the radially outer tip determines both head pressure and flow to some degree. If the angle is near to perpendicular to the housing inner chamber wall, the fluid velocity will exit through the tangential discharge port at the rotor radially outer tip velocity, and thus be a high head design. Generally, this junction is more in a radial than tangential direction such as in the case of centrifugal pumps.

In my embodiments, this is shown in Fig 1A, Fig 2A. Fig 3A, Fig 4A, Fig 6A, Fig 8A, Fig 9A. This is not shown in any shown in any of the cited art. Price shows an approximate radial orientation but does not show close proximity for sealing.

5. The understanding of the fluid pressure gradient in a fluid contained within the rotor or impeller passages is essential to the pump design and leads to certain inventive embodiments. If the discharge is closed, there will be a

pressure gradient within the pump, which is negative at the axis of rotation, and high at the rotor or impeller periphery. A continuous range of isobars are formed as cylindrical surfaces within the fluid. In taking advantage of the isobar concept, isobars on the intake are shown by dot-dash lines in Fig 1A and Fig 1B, Fig 3A, Fig 4A. These show containment of the fluid such that it is trapped within rotor fluid passage chambers.

This is not evident in the cited art of Price, Ask or Chow.

6. In order to insure the discharge exists at an isobar near the rotor periphery, Fig 3A shows the rotating fluid chamber to be on the outer rotor diameter so that only the outer fluid is ejected through the tangential discharge port by momentum.

Fig 4A shows multiple tangential discharge ports that take advantage of the forming of isobars within trapped fluid.

Fig 8A and 8B shows multiple discharge ports located at different isobars of pressure, so that there are three pressure-volume possibilities. Note than in Fig 8A the ports are made on arcuate isobars.

Fig 9A also shows two possibilities of discharge ports located on different isobars. These features are not evident in the cited art, unless we consider the sidewall volute at 6 in the Ask pump, however, Ask claims the opposite effect than actually will result. There are instantaneous isobars generated in contained impeller volumes in the Chow pump, but the function is detrimental rather than beneficial.

7. There is one motor embodiment in which the tangential inlet is shown to be similar to the pump of Fig 6A, and is shown in Fig 5C and Fig 5D showing a double tangential inlet. The fluid enters the device in exactly the same manner as in the pump of Fig 6A, but does not fill the impeller chambers as in 6A, but instead strikes the rotor vanes which are not like the pump vanes, but more like centrifugal pump vanes, and the discharge extends the full 360 degrees.

This is not evident in any of the prior art of Price, Ask or Chow, except that the vane configuration is generally similar to the impeller of Ask, except that where Ask has vanes tapering to smaller width on the radially outward extremity, this embodiment has the vanes not tapering inward, but should be tapered outward, or wider at the outer diameter although I have shown them as the same width, and Ask shows a pump rather than a motor. In many pump designs, a motor can be a pump run backward. This is not the case here.

In conclusion, the foregoing represents inventive steps taken and is referred to the figures in the drawings. Also, I have included my comments on the relevance of the cited prior art of Price, Ask, and Chow on these inventive steps.

Respectfully submitted,

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